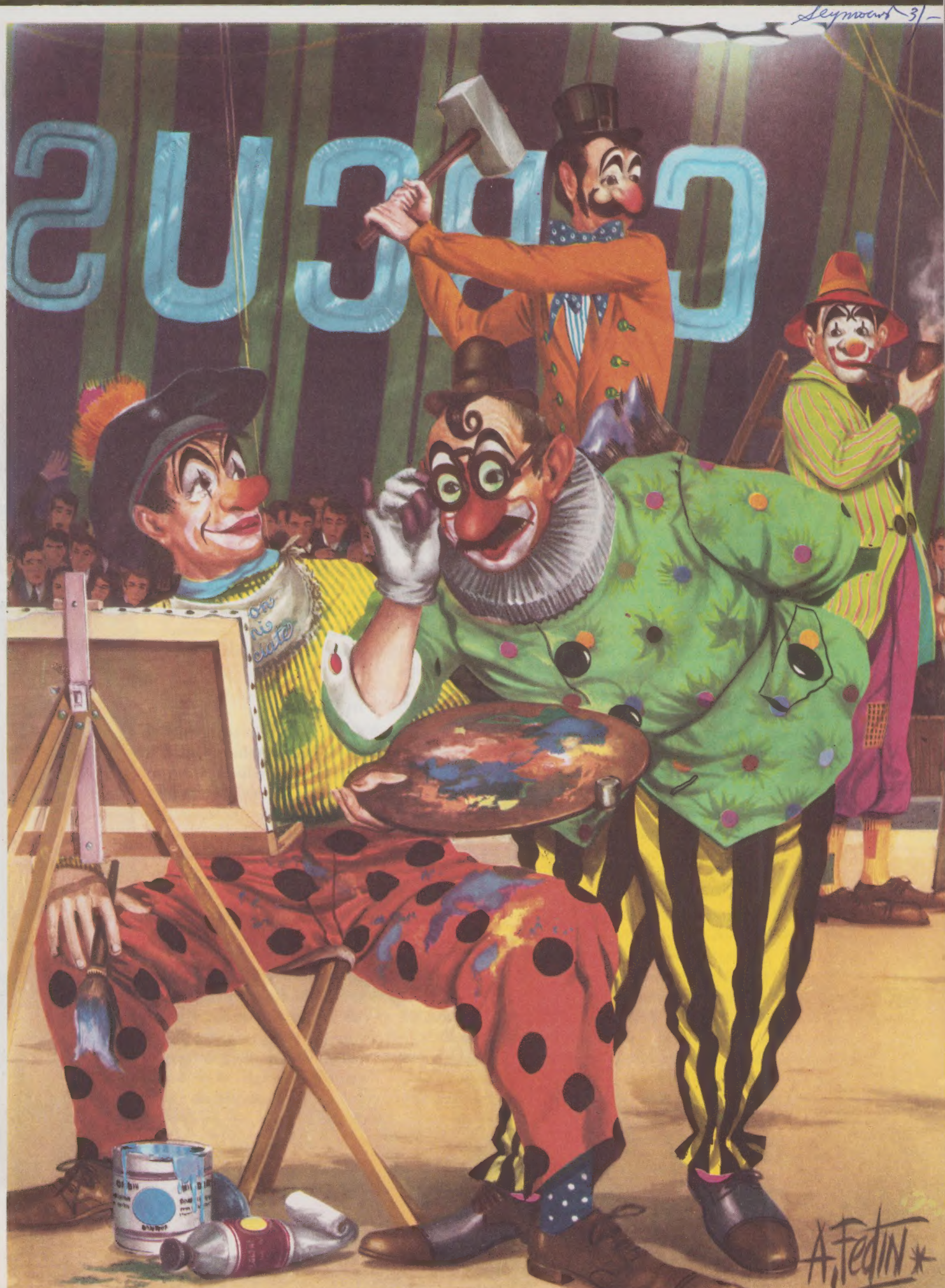


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YOU will probably never forget your first visit to the circus; and if you ever go again in later life the smell, the noise, and the atmosphere of the 'Big Top' will bring back to you the excitement of your first visit.

But the circus that you know has only existed for about 200 years, although its roots go back for many centuries.

Perhaps the oldest kind of circus entertainer is the acrobat, who must have first appeared as early as one man found that he was able to balance better than his companions, and used his talent to amuse them.

Acrobats were numerous in Ancient Rome, and it was here that the first circus buildings were constructed. But despite their name, the purpose for which the Roman circuses were used bears almost no resemblance to circus entertainment today. They were built to house the *ludi circenses* (circus games) which were traditionally founded by Romulus, and included races on foot and on horseback, and combats between gladiators and wild beasts. Temporary buildings, and, later, permanent race courses like the Circus Maximus, were put up for these *ludi*, but unlike the circus buildings of today they were oval, not round. Terrifying chariot races were held

in them in which men and horses were often killed; but another display took place which is often seen in circuses today. This was trick riding; the *equus desultorius* (horse leaper) would stand on two horses galloping side by side, or leap from one to the other. But apart from this the ancient circuses do not resemble ours at all.

Entertainers in Britain

In Anglo-Saxon times in Britain companies of tumblers, jugglers, and acrobats would travel round from village to village. Often they led performing animals like bears and monkeys round with them. 'Educated' horses which did wonderful tricks were very popular, and a 16th-century horse called Morocco was taught to 'dance' and 'count'. Morocco and his trainer travelled all over Europe, and Shakespeare refers to this 'dancing horse' in *Love's Labours Lost*.

In the meantime, menageries of wild beasts had grown up. The Royal Menagerie was housed at the Tower of London from the 13th century on for 600 years. Smaller menageries travelled round the country from fair to fair; the animals were not taught tricks but merely displayed to the public like those in a zoo.

A chariot race in a Roman circus

A performing chimpanzee walks on his stilts



Previous page: Circus clowns, adored by most children, go through some of their amusing tricks between the more spectacular circus acts.



A seal beach in the Falkland Islands. The species here is the southern fur seal which is a member of the Otariidae or eared seals. Note the difference in size between the bulls and cows

WE think of the sea as the home of fish, but in fact there are three groups of mammals which are not only more at home in the sea but which are not really at home on land at all. These are the whales and dolphins (*Cetacea*); the manatees and dugongs or sea cows (*Sirenia*); and the seals, sea lions, and walruses, collectively known as *Pinnipeds*.

The pinnipeds are found in the colder oceanic waters throughout the world, especially in the north Pacific and Atlantic Oceans. There are, however, a few species of seal which occur in tropical waters, and in enclosed seas, and even in fresh-water lakes. They include the monk seal of the Caribbean, the Caspian seal, and the Baikal seal of central Asia. In the south-east Pacific, seals and sea lions migrate from colder waters nearly as far as the equator—they do so along the line of the cold Humboldt current which provides them with the same food as they can find nearer the Poles. There are millions of pinnipeds; some species like the common seal are abundant, but others like the Ross seal, which has seldom been seen, are very rare.

A sea change

Mammals living in water naturally need to have special adaptations. As you can see from the seal's skeleton below, their limbs are short and have been converted into flippers, with the hind ones acting as a rudder. The fingers of their hands and feet are enclosed in skin to make swimming easier; and under the skin they have a thick layer of fat (blubber) which helps to protect their bodies from the cold. They have short, coarse hair, and some species have an undercoat of thicker, finer hair. Their nostrils

SEALS AND THEIR KIN

and ears are specially adapted for deep diving; the external ears of many species have almost disappeared.

Most of the pinnipeds are large and heavy animals; the largest seal, a bull elephant seal, may measure 20 feet in length and weigh between three and five tons.

Land habits

Although the pinnipeds are so modified that they are able to spend most of their lives at sea, they are also capable of living on land. The fur seals and sea lions, which can still use their hind flippers for walking, are quite agile on land, while a bull elephant seal over short distances can move almost as quickly as a man can run. None of the other marine mammals can move about on dry land; on the other hand they can breed in water, whereas none of the pinnipeds can. For this reason pinnipeds have to make an annual journey to land. Most species of pinnipeds are polygamous; one bull seal often has a collection of 15 to 20 cows. They are also mostly very gregarious. Although their winter wanderings may take them hundreds or even thousands of miles, the majority of a herd will return year after year to breed, often to the same part of the same beach and on the same day in early summer. The seals on the noisy, crowded beaches at this time of year provide an all-too-easy target for the fur hunters.



*The skeleton of the common seal (*Phoca vitulina*) in the position adopted during swimming*

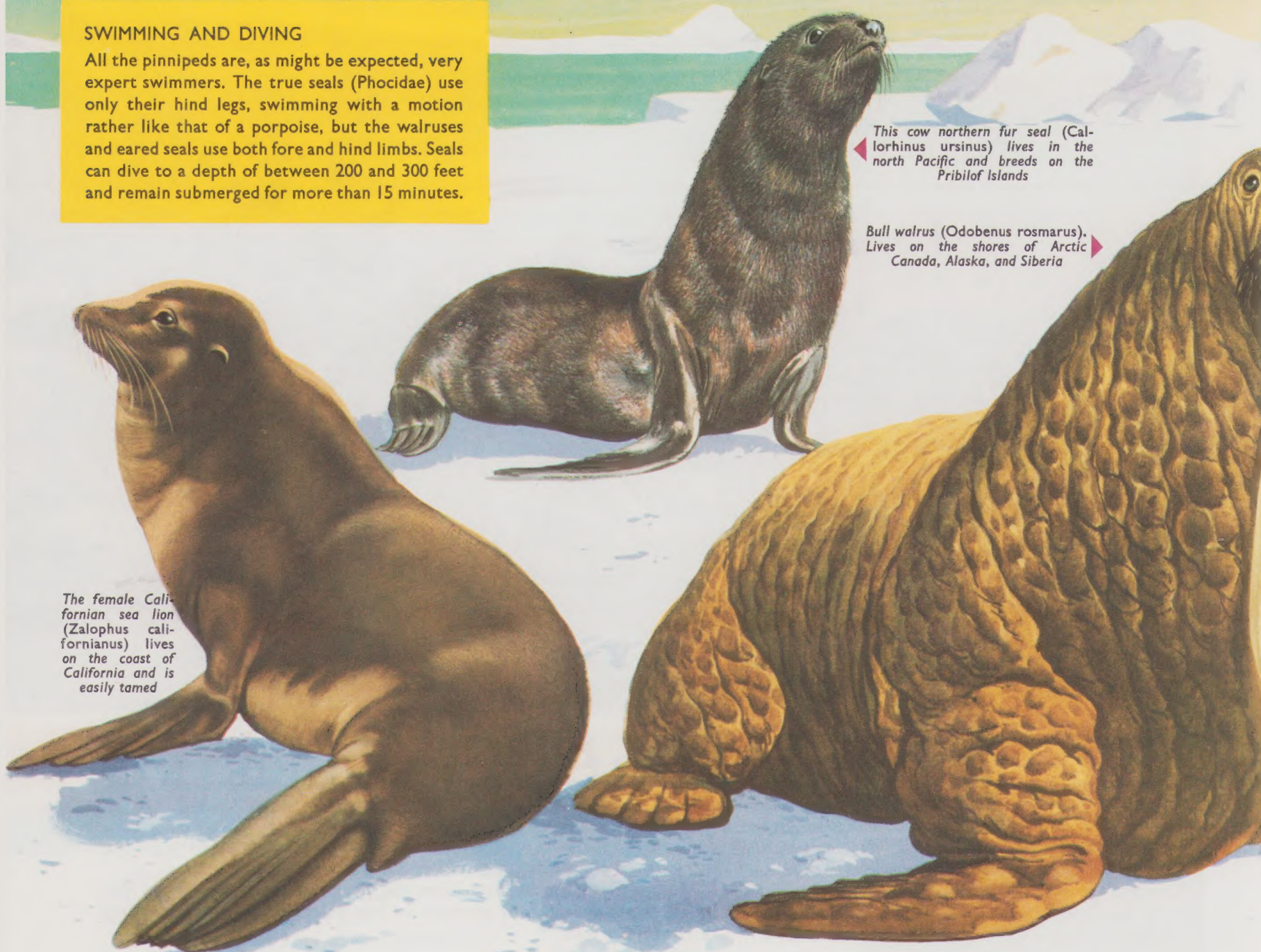
SWIMMING AND DIVING

All the pinnipeds are, as might be expected, very expert swimmers. The true seals (Phocidae) use only their hind legs, swimming with a motion rather like that of a porpoise, but the walruses and eared seals use both fore and hind limbs. Seals can dive to a depth of between 200 and 300 feet and remain submerged for more than 15 minutes.

This cow northern fur seal (*Callorhinus ursinus*) lives in the north Pacific and breeds on the Pribilof Islands

Bull walrus (*Odobenus rosmarus*). Lives on the shores of Arctic Canada, Alaska, and Siberia

The female Californian sea lion (*Zalophus californianus*) lives on the coast of California and is easily tamed



The pinniped trio

The pinnipeds consist of three different families. First there are the Otariidae or eared seals – that is, the fur seals and sea lions – which are distinguished by their small external ears and ability to use their hind flippers for walking. Secondly there are the Odobenidae, now only represented by the walrus which is characterised by its large tusks. Thirdly there are the true seals, Phocidae, which are the most fully adapted to marine life.

The eared seals

The different species of eared seals (Otariidae) are found in the southern hemisphere and the north Pacific Ocean. The most important species include the northern and southern fur seals and five different species of sea lion. The largest is Steller's sea lion which is found on the Pacific coast of North America; the bulls of this species may be as much as 13 feet long. In general the cows of all eared seals are

only half or two-thirds as long as the bulls; they are all polygamous and live in large communities.

Because of their regular breeding habits, nearly all these species have been threatened with extinction. The fur seals of the Pribilof Islands and of the sub-Antarctic islands have only survived due to strict conservation laws. But the Californian sea lion is plentiful, and is the species usually seen in circuses and zoos.

The walrus

The walrus is one of the larger pinnipeds, often exceeding 10 feet in length. It is now confined to the Arctic shores of Canada, Alaska, and Siberia. There are certain differences between those of the Canadian Arctic and those of the Siberian coasts.

Their numbers are declining both because they are easy to kill and because they breed more slowly than the other pinnipeds.

A walrus cow can only produce one calf every two years, whereas all other pinnipeds breed annually. The walrus lives entirely upon shell fish, unlike the diet of fish and cuttlefish common to all other pinnipeds. But like most pinnipeds, it is extremely gregarious.

True seals

True seals (Phocidae) are distinguished from the Otariidae by having no external ear flap, and by their inability to use their hind flippers for movement on land. There are large numbers of different species, most of which are found in cold temperate seas and in the Arctic and Antarctic. The largest is the elephant seal of the Antarctic.

There are two British species. Common seals are fairly numerous in the North Sea, breeding near the Wash. The Atlantic grey seal is found along the whole of western Britain from Cornwall to the Hebrides, and also on the east coast



Bull elephant seal (*Mirounga leonina*) lives in Antarctic waters. The largest of all species of seal

Weddell seal (*Leptonychotes weddelli*). Lives in Antarctic waters. More solitary than any of the other seals illustrated here

as far south as the Farne Islands. Most true seals are gregarious; the leopard seal, which lives almost entirely upon penguins, and the very rare Ross seal never seem to congregate in large numbers. These are both Antarctic species. Unlike most other pinnipeds, true seals, except for elephant and grey seals, are not polygamous.

Enemies of the pinnipeds

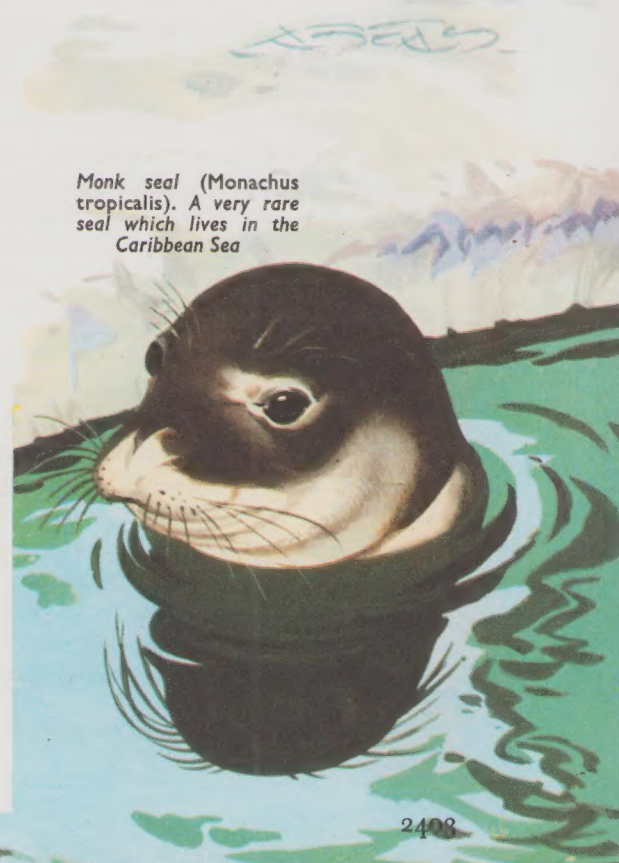
In Antarctic waters only the killer whale is big enough to tackle a fully grown seal, and it is a fearsome enemy of those it preys on. It is, for instance, quite unusual to find an adult crab-eater seal which does not have big scars — evidence of a narrow escape from the killer's teeth. The leopard seal has been known to kill newly born elephant seals if these are carried out to sea by the break-up of the ice-floes on which they were born.

On land, however, there are no natural enemies, and hence the Antarctic pinni-

peds are quite oblivious to the danger of men. For example, sealers working the beaches of South Georgia and the South Shetland Isles early in the 19th century found the seals remaining fearless on the beaches until clubbed to death, instead of taking refuge in the sea.

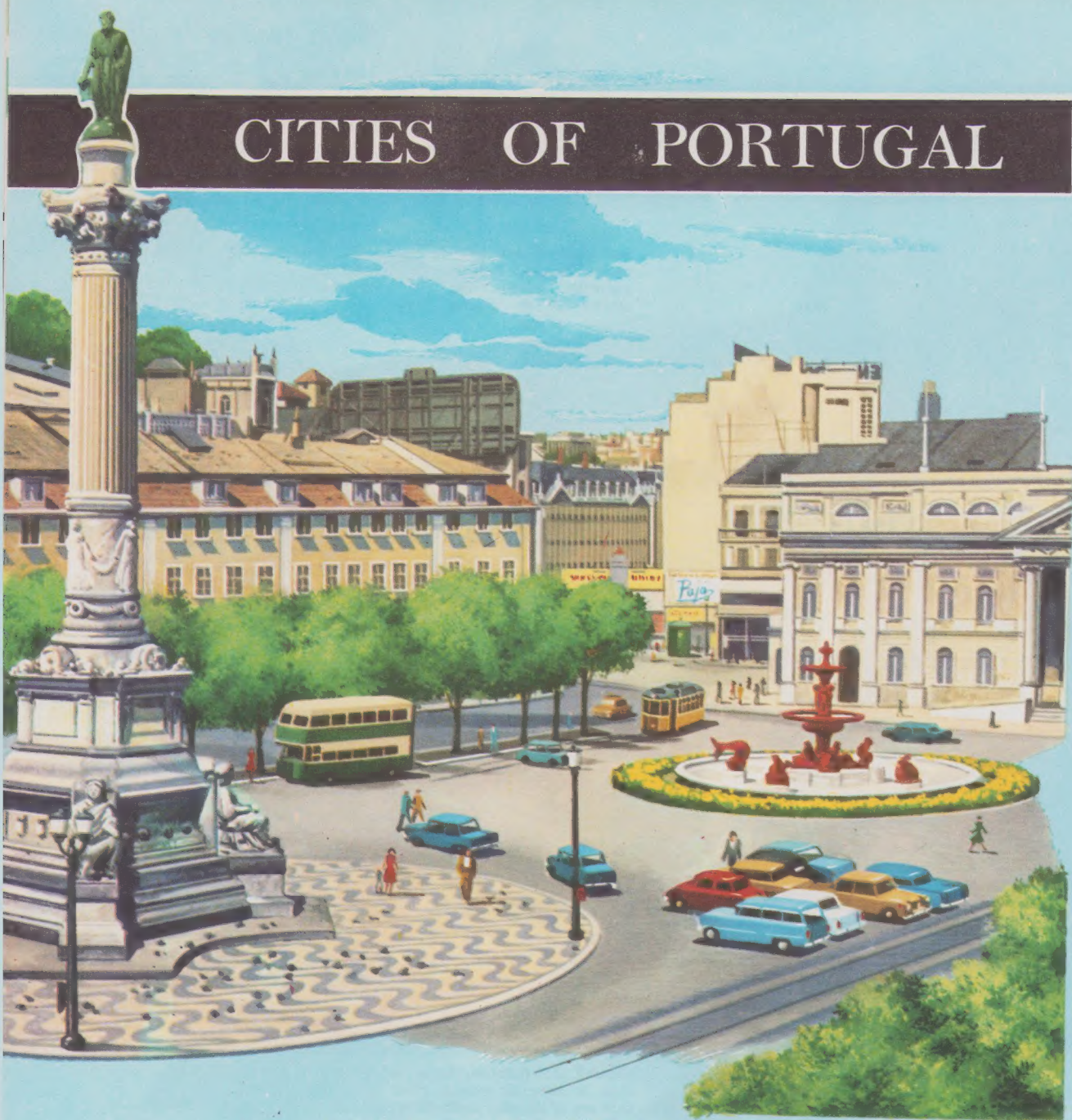
In the Arctic, by contrast, most of the natural enemies are land carnivores, particularly the polar bear and the wolf. Therefore the seals of the Arctic are much more wary when on land, and, indeed, the Eskimoes have had to develop special techniques for hunting them at different seasons.

In summer, seals must be stalked from kyaks and shot before they have time to slip from an ice-floe into the water. In winter, when the ice is more extensive, the Eskimoes depend upon the seals' need to breathe frequently; they cut breathing holes in the ice at which they wait with a harpoon until a seal comes up for air.



Monk seal (*Monachus tropicalis*). A very rare seal which lives in the Caribbean Sea

CITIES OF PORTUGAL



The centre of Lisbon is the busy Praça Roçio with (left) the monument to King Pedro IV (1798-1834)

PORTUGAL, perched on the extreme south-west corner of Europe, is divided from it by the mountain ranges that form her borders. Cut off physically by these mountains and mentally by their desire for independence, the Portuguese have always looked far afield, to the Atlantic, Indian, and Pacific Oceans, for new empires to conquer. Portuguese navigators were the first to sail round the world, and the Portuguese empire, with possessions in the Americas, Africa, and the Far East, was one of the greatest, and richest, of all time (see pages 434-435).

The proud Portuguese, with their love of liberty, fiercely resisted the many invasions that occurred during the history of the Iberian Peninsula. The influence of two invaders, the Romans and the Moors, can still be seen in some cities.

Most of Portugal's 9 million inhabitants live near the coast, while the high granite ranges to the east and north are only sparsely populated. In the south the Algarve mountains give way to a large, fertile plain.

Farming and fishing are still the main industries, but many new factories have risen around the larger towns. In recent years Portugal has achieved a new importance through her position on the main transatlantic air and sea routes.

◀ A map showing the principal cities of Portugal



A MODERN CAPITAL

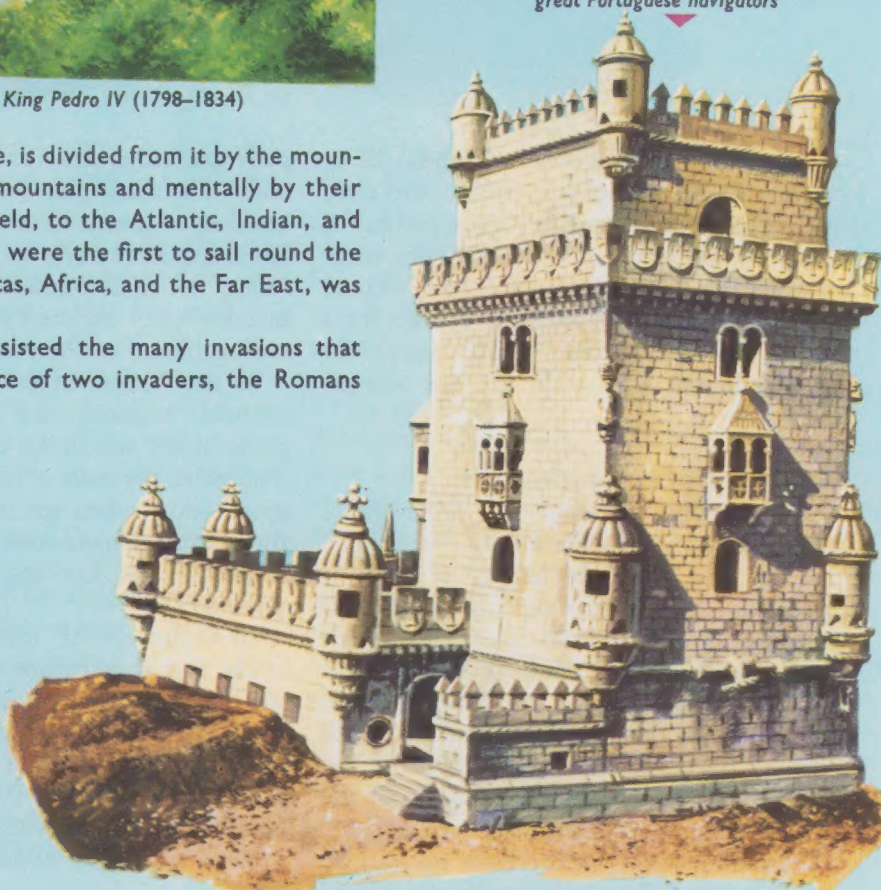
Lisbon, the capital of Portugal, has 818,000 inhabitants, and is the most westerly capital of Europe. Lisbon stands on the estuary of the river Tagus which forms a well-protected natural harbour, 7 miles wide, known as the *mar da Palha*.

Over 2,000 years ago it was the capital of Lusitania (as Portugal was then called), and its name, Olisipo, gave rise to the legend that Ulysses founded the city. The Moors captured it in A D 713 and called it Lashbuna. Its Portuguese name is now Lisboa.

The *Cidade Baixa* or lower city of Lisbon lies in a valley between two steep hills. The tall houses and narrow streets of the old city crowd the slope to the east, dominated by a Moorish citadel; to the west rise modern suburbs and terraced gardens. The city also has a university which was founded in 1911 and now has over 5,000 students.

The lower city was destroyed by an earthquake in 1755 and entirely rebuilt with straight avenues, gracious houses, and beautiful squares. Much of the old city survived, however, including the tombs of the Braganza kings and the relics of St Vincent, Lisbon's patron saint.

In Belem (a suburb of Lisbon) stands the fortress of St Vincent. It was built as a monument to Vasco da Gama and other great Portuguese navigators





The Dom Luis I bridge across the river Douro at Oporto supports two roadways

CENTRE OF THE WINE INDUSTRY

Portugal's second largest city and the centre of its wine industry is Oporto (population 310,000) on the Douro river. It was known as *Portus Cale* under the Roman occupation – the origin of the name Portugal. Oporto means 'the port', but sand bars prevent large ships from reaching the city; instead they use the artificial harbour built 3 miles away on the coast at Leixões.

The wine industry for which Oporto is famous was established in the 17th century by British merchants. The grapes are grown further inland, in terraced vineyards along the Douro gorge; the new wine is then brought down-river in flat-bottomed barges to be blended and matured in vast wine storehouses.

Oporto's university was founded in 1911; in the old quarter is the cathedral built by Prince Henry the Navigator, the bishop's palace with its fine library, and the remarkable 18th-century Torre dos Clerigos, 245 feet high.

THE CULTURAL CENTRE
Coimbra (population 43,000), on the Mondego river, is a rich city, both materially and artistically. For 250 years (1139–1388) Coimbra was the capital of Portugal and is today its cultural centre. The former royal palace, on a hilltop overlooking the city, now houses Portugal's oldest university, founded in Lisbon in 1290 and transferred here in 1537.

A seven-arched stone bridge connects the old city on the north bank with the modern suburbs to the south, beyond which lies the airport. The surrounding countryside is fertile, producing wine, maize, and almonds for export.



The old cathedral of Coimbra, built in the second half of the 12th century

CITY OF SALT

Setubal (population 44,000) is a flourishing sea-port at the mouth of the Sado river, with a harbour second only to that of Lisbon. It is the major sardine-canning centre, with other industries such as boat-building, biscuit and soft-drink making, pottery and cork. This district is also famous for its oranges and muscatel wine, while the marshes of the Sado produce quantities of salt.

In the 15th century Setubal was the residence of King John II. The city was considerably damaged by the great earthquake of 1755.

The salt beds in the Sado marshes, near Setubal

OTHER INTERESTING TOWNS

NAZARÉ, in the Leiria district, is a popular tourist resort on the coast with lovely bathing beaches. Fishing is the principal occupation here, but there is also a watch-making factory.

BRAGA, in the north-west, is a religious centre, and the seat of Portugal's senior Archbishop. On the summit of Monte Espinho, 1,850 feet high, is the pilgrimage church of Bom Jesus do Monte.

A fisherman from Nazaré in the traditional costume of the district



FATIMA, a village between Nazaré and Tomar, has been a place of pilgrimage, comparable with Lourdes in France, since 1917. A vision of the Virgin Mary was seen here and a cathedral built on the site.

The Cathedral of Our Lady at Fatima



EVORA lies in the fertile cultivated lowlands in the south-east. A Roman temple to Diana still stands, beautifully preserved. The whole town seems to have retained the atmosphere of the Middle Ages with many reminders of the Moorish occupation. It has been a trade centre throughout Portuguese history and is also the seat of an Archbishop.

TOMAR, farther north, is protected by the castle of the Knights Templars, built in the 12th century as a defence against the Moors.

THE AZORES AND MADEIRA

These two island groups, first settled in the 15th century, are administered as part of Portugal. The Azores, with two modern airports, are today an important communications centre and starting point of the great under-sea cables. Ponta Delgada, the capital, has 23,000 inhabitants.

The capital of Madeira is Funchal (population 37,000). Madeira, famous for its wine, shares the Azores' mild climate; they are both popular health and holiday resorts.

IRON



The famous iron column at Delhi which is still standing after 15 centuries

THE secret of extracting iron from its ores has been known to man for many thousands of years. The Assyrians, Ancient Egyptians, Greeks, and Romans all worked and fashioned iron to make tools and weapons. Today hundreds of millions of tons of iron are produced each year, for iron is used to make steel, and steel forms the backbone of all industries.

Although iron is the fourth most common element in the earth's crust, it is rarely found as a pure metal, except in very small quantities in meteorites. Its two main ores are haematite (containing Fe_2O_3) and limonite (also containing Fe_2O_3); other deposits contain the ores magnetite and siderite. Iron is extracted from these ores by blowing heated air through a mixture of ore, coke, and limestone in a furnace (see page 225). The crude metal, called cast iron or pig iron, runs out of the bottom of the furnace. The cast iron is then purified and mixed with other materials to make the many different steels used by industry.

CHEMICAL PROPERTIES

Pure iron is a soft, ductile, grey-white magnetic metal which forms two series of simple compounds called *ferrous* and *ferric* compounds. In ferrous compounds each iron atom, when it combines, loses two of its outermost electrons; that is, it is *bivalent*. In ferric compounds the iron atom loses three electrons; that is, it is *trivalent*.

Iron will combine directly with most non-metals such as sulphur, phosphorus, and carbon at moderate temperatures. It will dissolve in most acids to form ferrous and ferric salts; but if a piece of iron is immersed in concentrated nitric acid it does not dissolve, and the iron is made *passive*; it will then not dissolve in dilute acids. This is because a film of iron oxides has been formed on the surface which protects the metal underneath from any further attack.

Most ferrous salts are pale green in colour, but solutions of ferrous salts in water are easily attacked by oxygen in the air and soon turn yellow-brown. This shows that the corresponding ferric salts have been formed.

OXIDES OF IRON

Iron forms three simple compounds with oxygen: ferrous oxide (FeO) is a black

The Etruscans used small conical clay furnaces like this to extract iron. Layers of pine wood and ore were fed through the hole in the side. The holes at the top and bottom were for ventilation



powder which easily dissolves in acids; ferric oxide (Fe_2O_3) is a brownish-red compound made by igniting any ferric salt in air. It dissolves extremely slowly in acids. Ferroferric oxide (Fe_3O_4) is most simply made by passing steam over red-hot iron. It is frequently magnetic when it occurs naturally in

ores. About AD 1000 the Chinese made the first magnetic compass by suspending a rod-shaped piece of such an ore, called a *lodestone*, on a thread. They found that it always pointed in the same direction, which we now know to be the direction of the North Magnetic Pole of the earth.

These oxides play a very important part in the rusting of iron. When it is unprotected, iron that is exposed to the air soon becomes covered with reddish-brown rust which slowly eats into the surface, causing pieces of the metal to flake away. Rusting occurs in two stages: first the iron dissolves in the weak acid solution formed by the moisture and carbon dioxide in the air, and forms ferrous compounds. These then combine with oxygen from the air to make hydrated ferric oxide or rust. Hydrated ferric oxide is made of ferric oxide molecules each surrounded by several water molecules.

IRON IN THE BODY

Although there is only one-tenth of an ounce of iron in a normal adult human body, it is an essential element. An average adult needs less than half of a thousandth of an ounce each day to keep healthy; this is normally eaten as part of meat, eggs, fruit, or green vegetables.

Most of the iron in the body is found in the red blood cells where it forms part of a complex substance called *haemoglobin*. The rest of the iron is stored in the liver, spleen, and bone marrow until it is needed to make more haemoglobin. Haemoglobin is essential in the blood because it absorbs oxygen from the lungs and carries it round the body to any place where it is needed.

People who do not have enough iron in their bodies suffer from *anaemia*, which can be cured by giving the patient certain iron compounds.

PROPERTIES OF IRON

Symbol	Fe
Atomic number	26
Atomic weight	55.85
Boiling point	3,000°C
Melting point	1,535°C
Density	7.86

Iron has four naturally occurring isotopes with atomic weights of 54, 56, 57, and 58.

THE FEUDAL AGE

IN our articles on the Lord and the Manor (see page 1942) and on Feudalism (see page 2378) we saw how the feudal system worked. Now we are going to have a look at the period during which the feudal system was the basis of our society. This was from the 11th century to the 14th century and is known as the Feudal Age.

Feudalism was, first and foremost, the system of landholding whereby people received land in return for services. For instance, the serf would get his land for ploughing his lord's field. The lord would get his land for serving as a knight in his overlord's contingent, and his overlord might get his estates for providing a certain number of knights for the king's army.

But feudalism was also a way of life. Just as we have a society of free enterprise, so the society of the Middle Ages was *feudal*. We hope and often expect to improve our lot—but in feudal society everyone had a role to play and it was difficult to play any other. A serf never hoped to become a knight and often had difficulty in breaking the bonds that tied him to the soil. It was considered that God had given the serf his humble part to play in this world. But when he died he would be the equal of his master in heaven. St Anselm (1033–1109) wrote consolingly: 'Is not he who is a serf in the Lord the Lord's freeman?'

Thus we hear little about the working class in the Middle Ages. History is made by kings, barons, and Churchmen. At the top of mediaeval society

was the king. He ruled because God had ordained him to rule, and this is why the hand of God is often drawn over pictures of the king in the Middle Ages. Below him were the great men of the kingdom. In England they were, on the whole, not as powerful as the great men of France or Germany. They were known as *barons*. They expected to play a large part in the government of the country, and this caused many struggles between them and the king (see page 2385). They did not live in centres of government like Winchester or London but in their castles (see page 760). From these castles they governed the surrounding area where their name meant much more to the people than that of the king. Although royal justices appeared at regular intervals to try certain serious judicial cases, the daily life of the country was in the hands of these great men.

But there was another great power besides the king and the magnates. This was the Church. A powerful bishop, like the Bishop of Durham, was as influential as any earl. He would have many great estates with many knights owing him allegiance. Abbots, too, were often extremely influential, and men like the Abbot of Bury St Edmunds were considered to be among the most powerful people in the land. The king always sought to influence the elections of these important Church offices.

But from the 12th century onwards

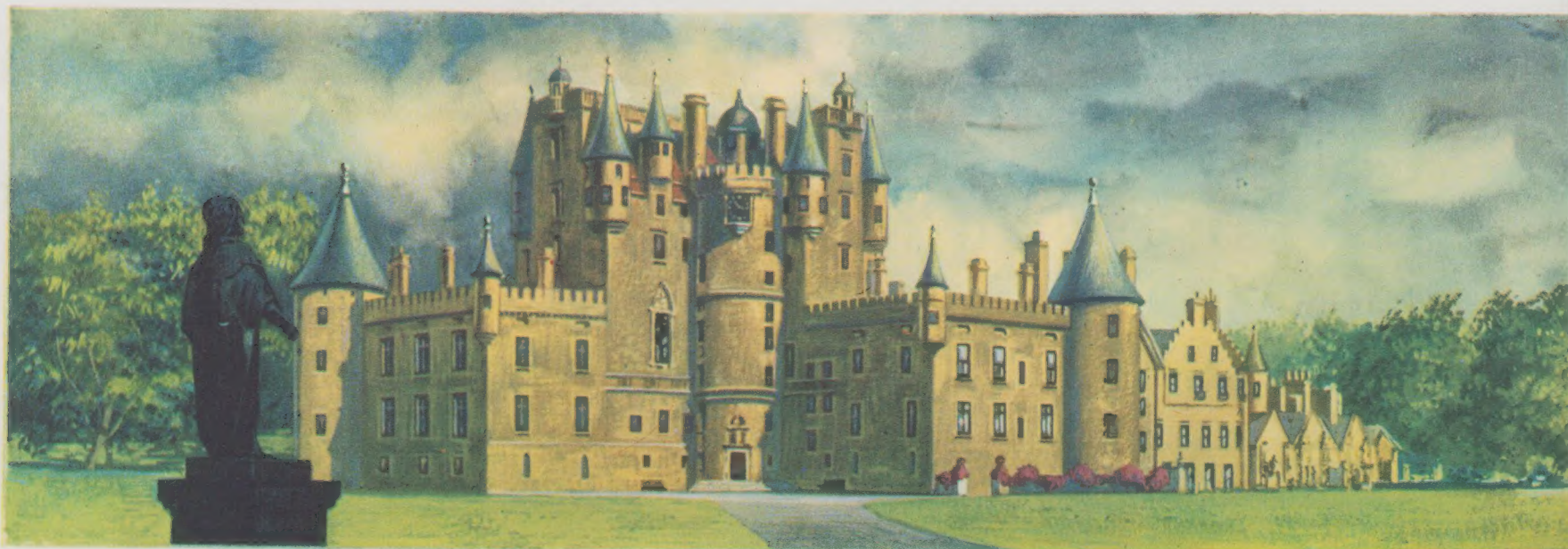


An early feudal castle; such simple forts developed into the magnificent castles of the late Feudal Age

there appeared an increasingly powerful professional civil service. Civil servants were, on the whole, men of humble birth, and they were rather contemptuously referred to as *novi homines* (new men). Two of the first of these were Ranulf Flambard in England (d. 1128), and Abbot Suger in France (d. 1151). Men like these helped the king in governing and were often appointed to important positions.

Many of these men were clerks—Churchmen who were not priests. These clerks became increasingly important as education improved. At first education was confined to the monasteries, but in the 12th century cathedral schools became more common, and soon great universities appeared. Many of the best-educated found their way to Rome and into the service of that great international organi-

Great lords lived in castles like Glamis in Scotland; Glamis was started in the 11th century, and has had many additions

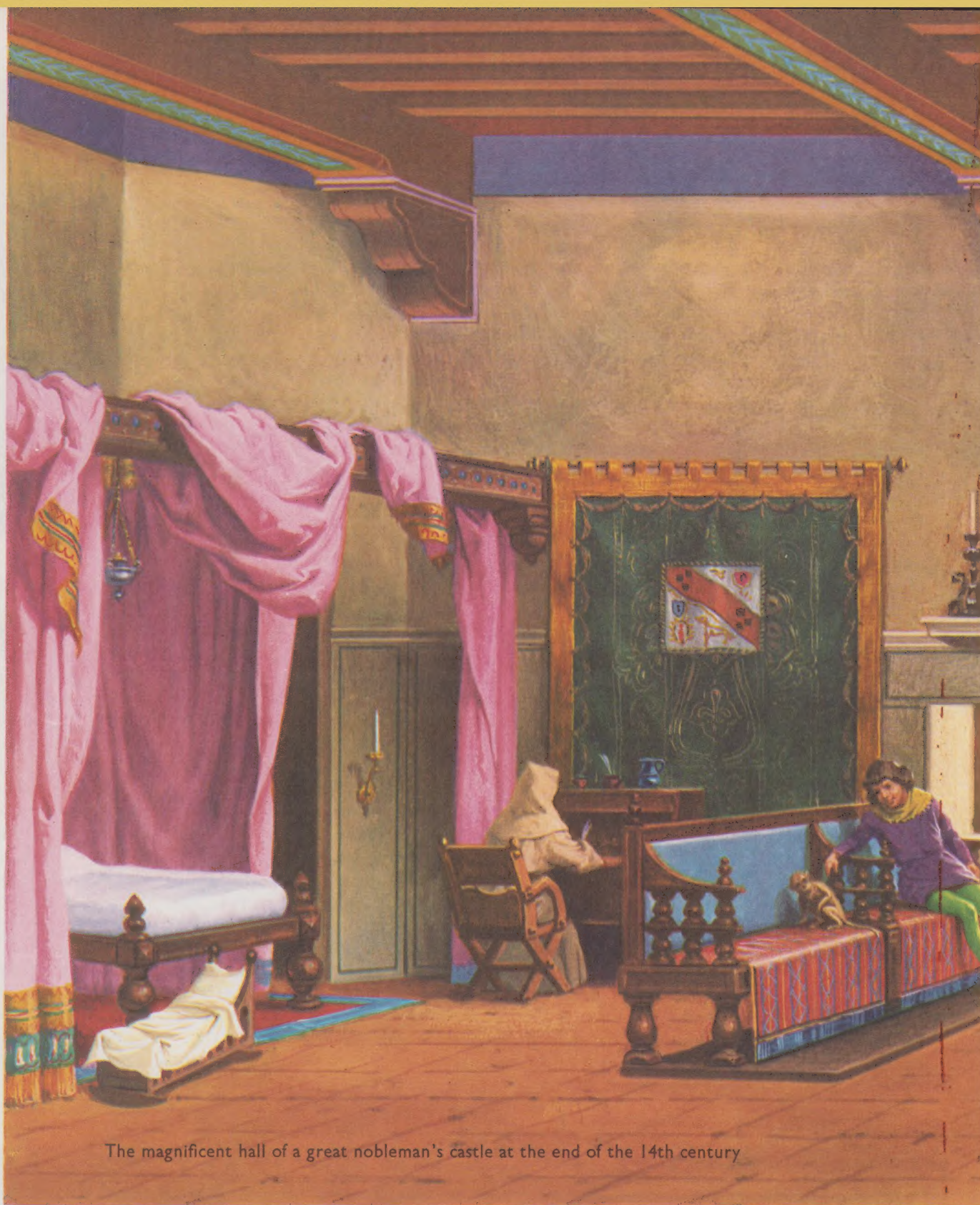


sation, the Papacy. Working there was rather like what working for the United Nations might be today.

Finally there were the towns, which developed as islands in the feudal system, where trade could take place. In the 12th century many towns grew up along the great European trade route which went from the eastern coast of England through Flanders, Champagne, Pavia, and Venice, to Byzantium, and finally to Kiev.

The growth of trade made money much more available. Near the end of the Feudal Age many great lords were commuting their feudal services for money, and their wealth was often matched by their magnificence. Indeed, the primitive castle at the beginning of this article, and the magnificent 14th-century interior on the right, symbolise the beginning and end of the Feudal Age.

As wealth increased, furniture became more common; below: a 13th-century cupboard



The magnificent hall of a great nobleman's castle at the end of the 14th century



2408



This intricately carved wooden throne dates from the early feudal period in France. The seat was of leather and has now perished. This throne is now in the National Library in Paris



Mediaeval men and women used to keep their clothes in coffers like this one, made in the 13th century



As the picture on the right shows, the late mediæval period was one of the most colourful in the whole history of costume. This was the age of the high wimples and long pointed *crakowe* shoes. The doublet and hose of the men and the high-waisted, flowing dresses of the women were of soft silks or jewel-like velvet, trimmed with furs or woven with gold and silver thread. The man second from the right is wearing his lord's livery. The peasant's tunic of rough woollen cloth in dull, often home-dyed colours, unlike the clothes of the rich, stayed the same for centuries. Chaucer (see page 348) gives a vivid picture of mediæval dress in his *Canterbury Tales*.



CHARLES DICKENS



Charles Dickens as a young man; after a drawing by George Cruikshank

AT the start of this century Charles Dickens was still an intimate part of many homes in England and indeed all over the world. His novels were read aloud in numerous family circles. He had even become part of the English language; for example, people called their umbrellas 'gamps' after Sarah Gamp, the disreputable old nurse in *Martin Chuzzlewit*, who always carried one. Ardent Dickensians made pilgrimages (and still do) to the houses where Dickens lived in Portsmouth, Chatham, and London. Today inn-signs, coloured prints, and Christmas cards still keep alive a whole lost world of coaching days, inns with roaring log fires, and red-faced benevolent landlords; a rosy world which has made future generations look back nostalgically to 'Dickensian England'.

Craving for success

Charles Dickens was born at Portsea, near Portsmouth, in February 1812. He was the son of a clerk in the Navy Pay Office (later immortalised as Mr Micawber in *David Copperfield*). And his father's Micawber-like habits (he constantly lived above his income) led to one of the vital

experiences in Dickens's life. For, when he was only 11, his father was put into the Marshalsea Prison for debt. Young Dickens was taken away from school and sent to work for a few months in a blacking warehouse in London. There he earned 7s. a week. This helped to foster that craving for success which became one of his main characteristics. Shortly, however, Dickens was able to go back to school, and his career proper began at 16. In succession he was a clerk in a lawyer's office; a newspaper reporter; a writer of short sketches for periodicals, signing himself 'Boz' (his youngest brother's nickname). In 1836 (when he was only 24) he became famous almost overnight as author of *The Posthumous Papers of the Pickwick Club* – the adventures of Mr Pickwick, his friends Tracy Tupman, Augustus Snodgrass, and Nathaniel Winkle, and his faithful servant, Sam Weller. This uproarious comedy was soon on everyone's lips. A fashionable doctor used to read *Pickwick* in his carriage between calls; and a famous judge read the latest number on the Bench while waiting for the jury to give its verdict.

Between now and his death in June 1870 Dickens wrote 14 more novels – almost all, like *Pickwick*, in monthly numbers. Many of them, including *A Christmas Carol* (1843), *Bleak House* (1853), *A Tale of Two Cities* (1859), and *Great Expectations* (1861), are still standard reading in the classroom. As a writer Dickens has many qualities; in fact many people consider that he is the greatest of



all English novelists. He could tell a story superbly and was a master at creating excitement, 'slapstick' or satirical humour, and horror. In addition he could move his reader to tears as easily as to laughter, although perhaps he sometimes rather overdid his pathos as when he kept poor Little Nell, in *The Old Curiosity Shop* (1841), protractedly hovering on the brink of death.





◀ *Oliver Twist asks for more; this illustration based on a Cruikshank drawing brings out the extravagant quality of Dickens's characters*

not nearly as interesting as those of his more exotic creations. Both Nicholas and Kate Nickleby are too good to be true, while Bill Sikes, the thoroughly evil villain in *Oliver Twist*, is much less interesting than the grotesque Fagin or Mr Bumble.

Amazing versatility

After *Pickwick* Dickens wrote *Oliver Twist* (1838). This could hardly have been in greater contrast. In place of high comedy comes black melodrama.

Dickens's versatility was amazing, and after this switch from comedy to melodrama his next novel, *Nicholas Nickleby*, was an attempt to combine both. *Nicholas Nickleby* was published in 1839, and already Dickens had established himself not only as a major writer but also as an influential supporter of social reform.

In *Oliver Twist*, the first of his 'social tracts', he had exposed the horrors of the workhouse. In *Nicholas Nickleby* he condemned cheap boarding schools run on tyrannical lines by sadistic and unqualified teachers.

In many of his novels Dickens draws a striking contrast between the exploiters and the exploited. But he is more than simply a critic of economic conditions, for he can recognise that a poor man can be bad just as a good man can be rich. Nevertheless he played an important part in publicising the conditions of the working classes in the mid-19th century, and it is perfectly possible that his novels had their effect on the improvement of the Poor Law, the revising of the laws of sending debtors to prison, and in general on the 'philanthropism' which developed as the 19th century advanced.

Dickens was more than a novelist – he became the most popular public speaker in England, being asked to speak at every kind of dinner and public function. He was also a traveller. He lived in Italy for a year (in a palace in Genoa) and went to America. He wrote

books about both countries – infuriating the Americans by his denunciation of slavery and of many of their business habits. He had a passion for the theatre and toured the country with his own amateur company, both producing the plays and acting in them himself. He created and edited two immensely popular weekly papers, *Household Words* and *All the Year Round*, and even founded a national newspaper, the *Daily News* – but he was too autocratic to be a good editor, and resigned after three weeks. And in the last years of his life he gave a great number of public readings from his novels; their effect was sensational – some women used to faint when he read the description of Bill Sikes's murder of Nancy in *Oliver Twist*.

Private sorrows

His public life was a succession of triumphs. But his private life had many sorrows. An unsuccessful love affair at 19 had a lasting effect on him. His sister-in-law, Mary Hogarth, whom he adored, died in his arms, as a girl of 17. Although he had 10 children, he did not live with his wife for the last 12 years of his life, and many of his children either died young or disappointed his high expectations for them in their careers.

He died himself at only 58 in the middle of his last novel, *Edwin Drood*, worn out and ill from the intense strain of his last public readings.

Dickens was one of the truly great artists who saw the world in richer colours than it is painted. And his work has left it a richer place.

The famous court scene from Dickens's first great success, the Pickwick Papers; it is based on an illustration by 'Phiz'



◀ *David Copperfield and Peggotty leave Mrs Gummidge in tears; after a drawing by 'Phiz' (Hablôt Knight Browne), who illustrated many of Dickens's books*

THE ROYAL SOCIETY



An engraving showing the bust of Charles II, patron of the Royal Society, supported by Lord Brouncker, the first president, and Francis Bacon

DURING the 16th century learned men in the universities of Europe began to take a new interest in nature and the things around them. Up to this time they had sought the answers to scientific problems

in the works of Aristotle and the other Ancient Greek philosophers. Since these were believed to be a complete explanation of all scientific problems, men saw no reason to perform any further experiments. They thought there was nothing more to be found out. But such men as Copernicus and Galileo realised that the knowledge of the Greek philosophers was very limited, and that many interesting facts could be discovered by doing experiments themselves.

Sir Isaac Newton, President of the Royal Society from 1703 to 1727



It was as a result of this new awakening of interest in science all over Europe that the Royal Society came into being.

HOW THE SOCIETY BEGAN

In 1645 a number of men interested in science (then called natural philosophy) began to meet each week at Gresham College in London. They set out to discuss physics, anatomy, geometry, astronomy, navigation, statics, and mechanics. Their subjects at these early meetings ranged from 'valves in the veins' to 'the nature of comets', from 'the weight of air' to 'the improvement of telescopes'.

At one of these meetings on 28th November 1660 it was decided to form a 'Society for promoting Physico-Mathematical Experimental Learning'. The members, called 'Fellows', were to pay 10s. for admission to the society and 1s. a week whether they attended the meetings or not. It was agreed to hold a meeting each week at Gresham College, and a list of 41 people thought fit to join was drawn up. Among the men present at the first meeting were Christopher Wren, Robert Boyle, and Lord Brouncker.

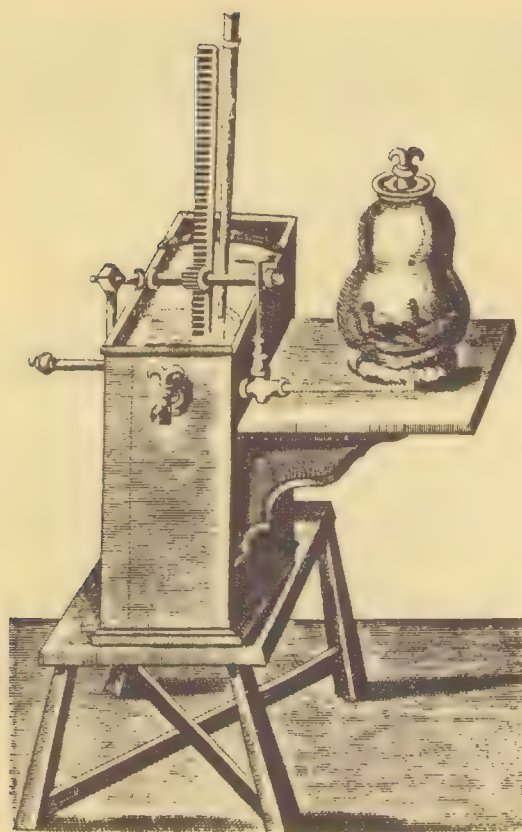
King Charles II became interested in the society, and in 1662 he granted it a Royal Charter. The society became the Royal Society of London, with Lord Brouncker as its first president. In the same year Robert Hooke was appointed curator, his duty being to demonstrate three or four experiments at each of the Society's meetings. Hooke was a lean, bent, and ugly man (which probably explains why no portrait of him is known to exist); however, he was an ingenious experimenter. He demonstrated to the Society such things as the expansion of metals, vacuum effects, and the force of gunpowder. He also showed the first effective compound microscope with which he made fascinating discoveries about insects. During these early years the Society was always short of money, which may be why so many non-scientists such as Samuel Pepys and the poet John Dryden were allowed to join.

Undoubtedly the best-known name in the history of the Society is Sir Isaac Newton, who was elected a Fellow in 1671 when he was 28 (see page 784). In 1687 he published his famous book, the *Principia*, and in 1703 he became President of the Royal Society, an office he held until his death in 1727. He took a very active interest in the affairs of the Society and presided at most of the meetings. He was widely recognised as a man of great genius, and, indeed, it was his fame that caused the reputation of the Society to rise so rapidly. Among Newton's contemporaries in the Society were the astronomer Halley, the mathematicians Taylor, Maclaurin, and De

Summons to a meeting of the Royal Society signed by Sir Isaac Newton

S I R,
THESE are to give Notice, That on
Monday the First Day of December 1712,
(being the next after St. *ANDREW'S*
DAY) the Council and Officers of the ROY-
AL SOCIETY are to be Elected for the
Year ensuing; at which ELECTION
your Prefence is expected, at Nine of the
Clock in the Forenoon, at the House of
the ROYAL SOCIETY, in Crane Court
Fleet Street.

To
Thomas Issued Elly
J. Newton P.R.S.



Robert Boyle's apparatus set up to show the necessity of air for living creatures

Moivre, and the inventor of the early steam engine, Thomas Savery.

After Newton's death the scientific activities and reputation of the Society declined, while the number of Fellows steadily increased until it was in danger of becoming just an exclusive social club. But when Joseph Banks was elected President in 1778 he took steps to prevent any unworthy person becoming elected. Banks was a very energetic man, and very generous both with the time and money he spent on the Society. He was mainly responsible for the foundation of Kew Gardens, and in 1768-1769 he also took part in a voyage with Captain Cook in which the object was for

The Anglo-American Ariel satellite



the Royal Society to observe the passage of Venus across the face of the sun.

In 1820 Sir Humphry Davy, then at the peak of his fame, was elected President. He is now chiefly remembered for his invention of the miners' safety lamp, but he was also the first chemist to discover the anaesthetic properties of nitrous oxide (laughing gas).

MODERNISING THE SOCIETY

In 1847 it was decided to change the procedure of election to a Fellowship, for discontent about the large number of non-scientific Fellows had been growing. Under the revised system (which is still in force today) six Fellows must sign a certificate supporting the candidate. The number elected each year was at first limited to 15, but it is now 25. This step has ensured that only the outstanding British men of science have become Fellows. There are at present about 600 Fellows in the Society, and 50 foreign members.

Since the turn of the 20th century the Royal Society has greatly contributed to the development of many new branches of science, such as radio astronomy, biochemistry, atomic and nuclear physics, and space exploration. Among the more recent presidents have been Sir William Crookes, who advanced the study of cathode rays; Sir J. J. Thomson, who proved that cathode rays are particles now called electrons; and Lord Rutherford, who established the existence and nature of radioactivity, showing that atoms were not necessarily stable and that they could be split.

FAR-REACHING INTERESTS

The Society has always been eager to support practical experiments. Although not state-controlled, it has advised the government on such things as the equipment of the Royal Observatory, Arctic and Antarctic expeditions, tidal movements, comparisons of weights and measures, and the investigation of certain tropical diseases (such as malaria), to mention but a few. It also advises the government on the handing out of certain grants, and finances world-wide projects such as the British part in the International Geophysical Year in 1957 and 1958, as well as financing research in narrower fields such as Bird Navigation.

The Society keeps right in the forefront of science, and its Fellows are continually opening up new fields of research. In 1962 it was responsible for the British part in



Robert Boyle (1627-1691), English philosopher, naturalist, and chemist

the first Anglo-American satellite 'Ariel'.

In the three centuries since its foundation the Royal Society has seen, and helped to make, tremendous advances in all branches of science, its prestige increasing with these advances. Today, more than ever, the greatest honour for a British scientist is the right to put the letters FRS after his name.

Sir Howard Florey, elected President of the Royal Society in 1960. He stands with the mace presented by Charles II over 300 years ago



THE BATTLE OF BRITAIN



A 'dog-fight' at the height of the battle

ON 15th August 1940 the fat commander of the German Luftwaffe, Hermann Goering, addressed a meeting of his subordinates. They had gathered at the Reich Marshal's magnificent country residence in Prussia to which he often retired to direct the affairs of the largest air force in the world, and to view his prize stallions.

Goering outlined the strategy of the

great air battle which had just begun over southern and eastern Britain. The Royal Air Force had to be smashed, declared the Reich Marshal, not only the planes, but the factories that produced them.

This was the necessary first step to Hitler's invasion of Britain – a plan which the Nazis referred to as Operation Sealion. Already France, Poland, Denmark, Norway, Belgium, and Holland had been

overrun by Hitler's forces. But Britain still remained defiant.

The German plan was for three great *Luftflotten* (air fleets), based on Norway, Holland, France, and Belgium, simultaneously to attack Britain. This was referred to by the Nazis as the *Adlerangriff*, or eagle attack.

And on 15th August the *Adlerangriff* began in earnest. The sights and sounds of that day, when the three *Luftflotten* attacked simultaneously, were to become familiar to Britons in the next two months. The sinister shapes of the bombers, Dornier 17s, Heinkel 111s, and Junker 88s, escorted by hordes of sleek, high-powered Messerschmitt fighters, filled the sky. But scarcely had they reached the coast than these death-dealing phalanxes were broken up. Spitfires and Hurricanes were among them. From the ground the people of England could hear the spluttering of machine guns, the cough of cannons, and the tortured roar of aero-engines, and see the white vapour trails, and the occasional trail of smoke leading towards the earth, which meant that one less man and one less machine was contesting this titanic battle being fought in the sky.

One German general had written before the battle began: 'It will take between two weeks and a month to smash the enemy air force.' The odds were certainly on the Germans – 3,500 planes could be used for the attack, and well over 1,000 of these were fighters. Against this the RAF could put up about 700 fighters, but not all of these were Spitfires or Hurricanes – about 80 were Blenheims and Defiant fighters, which were no match for the Messerschmitt 109s and 110s.

But Britain's Spitfires and Hurricanes

Heroes of the battle; in the foreground a Hurricane together with three Spitfires. They were at a commemorative display in 1957





Barrage balloons protected the British skies

were superb weapons. Powered by Rolls-Royce Merlin engines, they had eight machine guns, and with their superb manoeuvrability they were more than a match for any German fighter.

Yet these weapons would have been useless without the men, and what men those pilots were! Most of them were under 25. They combined aggressiveness and daring with a sense of humour and dedication. At the height of the battle they were almost continuously aloft for days on end.

But even the brilliance of the Spitfires, Hurricanes, and their pilots would have meant nothing were it not for the tremendous support they got. There was an efficient radar system which directed the squadrons against enemy aircraft as soon as, or even before, they reached the coast. And there was a tremendous spirit and drive in the factories and workshops which built new planes and serviced those in operation. The newly formed Ministry of Aircraft Production under Lord Beaverbrook worked wonders. There were also flying schools which turned out first-rate pilots in a few weeks.

But, above all, everyone concerned with the battle was fired by the spirit called for in Winston Churchill's words:

'What General Weygand called the Battle of France is over. I expect that the Battle of Britain is about to begin. . . . Let us therefore brace ourselves to our duties and so bear ourselves that, if the British Empire and its Commonwealth last for a thousand years, men will still say, "This was their finest hour".'

Intermittent aerial fighting over Britain had been going on for about a month before 15th August, but on this day the heaviest fighting of the whole battle took place – 76 German planes were destroyed as against 34 of Britain's. In the first stage of the battle the German offensive was mainly directed against airfields and factories near the coast. British squadrons deployed over southern and eastern England had often to meet vast concentrations of fighters and bombers with numbers often as much as 20 to 1 against them. Right from the beginning of the battle Air Chief Marshal Sir Hugh Dowding, commanding the British fighters, was faced with two great problems: to begin with, only about 100 Hurricanes and Spitfires could be produced weekly and many fewer pilots. Between 8th and 18th August Britain lost 154 pilots, and only 63 new fighter pilots were produced. In the same period she lost 213 fighters.

Things became really serious when the Germans ceased to concentrate on the coast and began to strike farther inland. In the fortnight before 7th September 378 German planes were destroyed and as many as 277 British fighters. This was a proportion of seven to five. The Royal Air Force could not stand this for long.

This period, when the Germans were concentrating on the British airfields and on the vital sector stations from which British squadrons were controlled, was the most critical. But when things were at their grimmest, Hitler took a fateful decision. On 7th September, on his orders, the Luftwaffe began an all-out attack on London, thus easing the strain on the airfields. As the German bombs rained down on London, Britain endured her finest hour. It was the poorer people in the East End who bore the brunt of the attack. They saw their homes and those of their neighbours vanish overnight. But while London burned, the battle was reaching its turning point. Between 7th and 21st September, when the attack on London was at its height, the Germans lost 262 planes against 144 British fighters. Even the mighty Luftwaffe could not take such terrible slaughter.



Hermann Goering, commander of the Luftwaffe

Moreover, the Bomber Command was keeping up its magnificent aggression. On 12th September this entry appeared in the War Diary kept at the German Headquarters: 'The enemy air force is by no means defeated; on the contrary it shows increasing activity. . . . The Fuehrer therefore decides to postpone Sealion indefinitely.' At the beginning of October the Germans abandoned full-scale daylight operations against London. On 12th October Hitler postponed Operation Sealion until the spring of 1941. He had lost the Battle of Britain. Between 10th July and 31st October the official British figures give 1,733 German planes lost, and 915 British. (*These figures are the subject of controversy.*)

How decisive was the Battle of Britain? It has been said that Hitler wanted Britain's surrender, not occupation – and that anyway it was the Navy's command of the Channel that really prevented an invasion. This may be so, but what is most important is that if the RAF had been knocked out of the sky, Britain's cities would have been defenceless. As Winston Churchill said: *'Never in the field of human conflict was so much owed by so many to so few.'*

The Luftwaffe's speedy Messerschmitt 109



HOMER

THE Greeks of the 5th century B.C. remembered that somewhere in the distant past a man named 'Homer' was connected with their two great epic poems the *Iliad* and the *Odyssey*. They were uncertain when he had lived, or where, though they thought his home had been in one of the Greek cities on the coast of Asia Minor, and they had some idea that he had been blind. And today we too know little more about the author of Europe's first great poems.

The *Iliad* and the *Odyssey*

The plot of the *Iliad* (which takes its name from *Ilios* or *Ilion*, the ancient name for Troy) revolves around Achilles. He was the finest warrior in the vast Mycenaean army which had sailed from Greece to Troy, on the Dardanelles, to avenge the stealing of Helen by the Trojan prince Paris. Achilles was forced by his commander, Agamemnon, to hand over his lovely captive girl, Briseis, and in retaliation swore angrily that he would no longer fight. The Greeks were defeated in battle after battle, but Achilles, bound by his oath and his pride, sulkily rejected their pleas that he should help them. At length his dearest friend, Patroclus, begged to be allowed to fight in the disguise of Achilles' armour. When Patroclus was killed by the Trojan champion Hector, Achilles was moved first to frantic grief then to warlike fury; after a murderous onslaught on the Trojans he met Hector, slew him, and tied him by the heels to his chariot. Then 'he lashed his horses, and they willingly sped on; dust rose from Hector's dragging body, his dark hair flowed loose around him, and his once fine head lay all in the dust'.

The story of the *Odyssey*, which we described on page 312, was composed some years later than the *Iliad*. It tells the tale of the Greek prince Odysseus's journey from Troy.

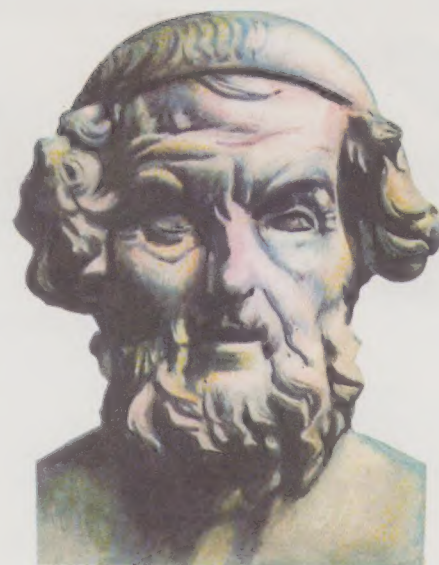
The authorship

What then do we know about the authorship of these poems? It has been suggested that the authors of the *Odyssey* and *Iliad* were different people. Variations in style between the poems have been noted – it has even been suggested, by the 19th-century writer

Samuel Butler, that the author of the *Odyssey* was a woman. Why then has Homer's name been associated with them? It may have been that Homer was some sort of bard, a superb teller of the ancient Greek epics; perhaps he never wrote down his poems himself – but when, several centuries after his death, they were written down his name was associated with them. There is a grandeur and poetic quality about the *Iliad* and *Odyssey* which suggest association with the mind of a genius.

The epic tradition

The *Iliad* is remarkably accurate in describing the Bronze Age Mycenaeans and the world of the 13th century B.C. when the sack of Troy took place. But there is strong evidence to suggest that it was composed in the 9th century B.C. How then could Homer, some 400 years after the Trojan wars, describe in such detail the



Bust of Homer (traditional)

the *Iliad* is obviously designed for an audience who were familiar with the whole background of the story, since Homer was able to take one incident in the history of the war and enlarge upon it while referring to others in passing, obviously confident that his listeners would understand his casual references.

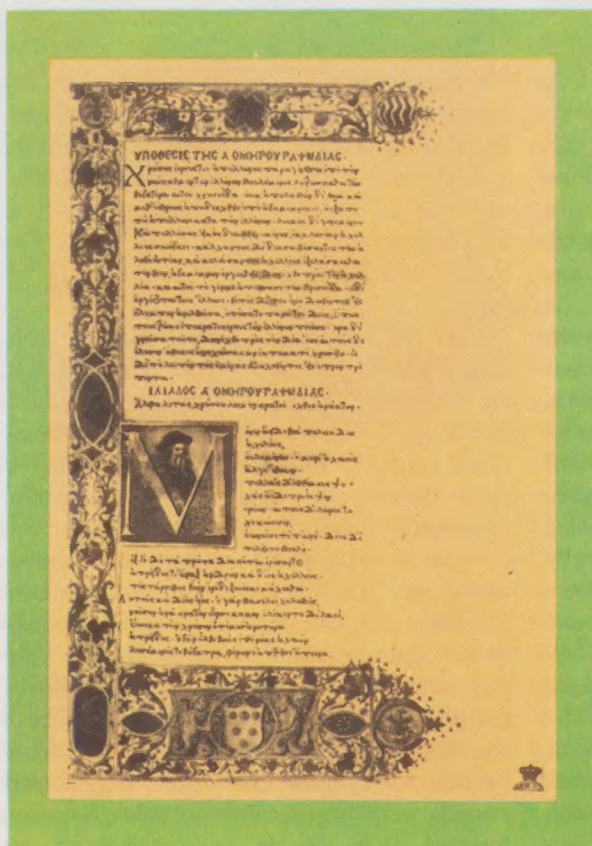
The grandeur of Homer

Homer used some of the typical similes, phrases, and techniques of the old bards, but he far surpassed them. One outstanding difference was in the length and unity of his poems. Most of the epic poems of the Greek bards had been short, but the *Iliad* and the *Odyssey* were very long – the *Iliad* would have taken five nights to recite. The main characters are drawn in greater detail than was usual, and the style and metre of the bards was used with greater distinction than ever before or since.

Homer's influence

The *Iliad* and *Odyssey* were recited all over Greece, and by the 6th century there was certainly a written text of the *Iliad*. The poems formed an essential part of Greek education, and the qualities of Homer's heroes served the Greeks as a standard of behaviour.

His epics have inspired poets of other civilisations to write their own: Virgil in Latin, Dante in Italian, Milton in English. But none has enjoyed the universal appeal of Homer.



A page from an illuminated 15th-century copy of the *Iliad* which belonged to Lorenzo di Medici

customs of a people which differed greatly from those of his own time? This was largely due to the traditions of the Greek bards, who travelled round telling stories of courage and adventure in the courts of kings and in army camps. Their poems were handed down by word of mouth from generation to generation, and they had a large stock of phrases and similes which enabled them to make up, as they went along, a poem on any theme which was asked of them.

Some of the most popular of these stories were those about the Trojan war; and indeed

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In fact although wild animals, acrobats, and jugglers play a very important part in our circuses, it was the growth in England of trick riding on domestic horses – much like that practised in the circuses of Ancient Rome – which led to the circus as we now know it.

The father of the circus

The man who really popularised trick-riding in England was Philip Astley, an ex-dragoon who gave displays of 'feats of activity on horseback'. It was Astley who realised that it was easier to balance standing on a horse if it cantered round in a circle. The earliest of his performances were given in roped-off rings in fields, but his act proved so popular that he was able to build a permanent ring near Westminster which he called his Royal Amphitheatre of the Arts. His programme included not only trick riding but acrobats, clowns, and the 'Little Military Learned Horse' who would perform all manner of tricks, including the firing of a pistol. Astley quarrelled fiercely with one of his employees, called Hughes, who left his master and set up a rival establishment a little way away which he called the 'Royal Circus'. Although this venture was short-lived in comparison with the Amphitheatre, which lasted about a century, the briefer name caught the public imagination, and such entertainments have been 'circuses' ever since.

Astley built many amphitheatres in England. In the French Revolution his Paris circus was taken over by Franconi, who first used the ring with a diameter of 13 metres (just over 42 feet) which is now standard in circus rings all over the world, so that a trainer can be sure that wherever he goes he will have the same space in which to do his act.

Travelling circuses

Obviously there was money to be made from showing circus tricks to country people, and pupils of Astley's started to travel round the countryside from place to place. Such circuses might include three or four horses, a few acrobats, and a clown; some of the smaller circuses had no tents

and performed in the open air. Performances would be short, and as many as 15 or 20 might be given in a day. Then the circus would move on. It must have been a terribly hard life.

Often these travelling circuses were purely family affairs, and parents and children between them could put on a good entertainment, each being able to turn his hand to several different things. Several of the great circus proprietors started with small family shows; among them was 'Lord' George Sanger. He started with performing birds and mice (like many others), and by 1871 was able to buy Astley's London Amphitheatre and present a 'spectacular pantomime' of *Gulliver's Travels* with 13 elephants, 9 camels, 52 horses, and two lions, as well as reindeer, bulls, buffalo, chamois, pelicans, ostriches, and kangaroos. Later he acquired still more animals. But Sanger had his hard times too; and in his early days had been reduced to selling home-made peppermint in the winter. This was always the hardest time of year for circus people, when the bitter weather put an end to their travelling, and they had to turn their hands to all manner of things to make a living.

Trained animals

For a surprisingly long time horses were the only animals in regular use in circuses. The first elephant appeared at Astley's in 1828, while Van Amburgh, the first trainer of 'big cats' to appear in a circus, arrived at Astley's ten years later. His methods of training were gentle, but some of the early acts with the big cats were unskilled and extremely cruel.

Methods of firm but gentle training were developed by Carl Hagenbeck, a German, who not only trained thousands of animals himself but also taught many others his methods.

Today all sorts of animals are used in circuses, including kangaroos which box, balancing seals, and even hippopotamuses. Strangely enough, bears, despite their slow, friendly appearance, are probably the most dangerous, and a circus saying is 'Bear trainers never retire'. They are vicious animals, and their expressions, unlike those



A highly bred and highly trained Liberty horse

of the big cats, give their trainers no warning of attack. Some of the acts with big cats are staggering; 'Lord' George Sanger trained a lion to lie down with a lamb between its paws, while a tiger has been trained to ride on an elephant. But acts with big cats still have to take place in cages, for accidents can take place.

Elephants and chimpanzees are almost the only animals who think out new tricks for themselves, and both seem to love their work. One elephant was taught to play a mouth organ, and was so delighted with her new talent that she played it constantly. Chimpanzees can perform all sorts of tricks – riding bicycles, walking on their hands,



and playing in bands; but when they reach the age of seven they become too bad-tempered to be used.

Perhaps the horses are the loveliest of all. Some, chosen for their broad backs and ability to canter steadily round the ring regardless of any distractions, are used for trick-riding and balancing; the highly bred Liberty horses have no riders but are controlled by their trainer with signals of his whip and occasional words of command.

All circus trainers insist that the only way to train animals satisfactorily is by kindness, since a frightened or sullen animal is never reliable. When accidents occur they are usually due to an animal's illness or to a mistake on the trainer's part. Great patience is needed to train animals, since it often takes several months to teach them a trick, so a skilled animal is very valuable and is looked after with every possible care.

Humans in the circus

Perhaps the most skilled and graceful of all human circus performers are the trapeze artists, who fling themselves from one bar to another high above the ring. Other expert performers are the tightrope walkers, trick riders, and jugglers. Human cannon-balls are shot out of a gun by means of a spring, and strong men lie on their backs and let cars drive over them.

The work of clowns has been curtailed by the enormous arenas in which they now play; the old talking clowns have almost disappeared, and on the whole clowns are now used mainly to fill in between other acts. Strictly speaking, most of the clowns today are *augustes*, not true clowns; the true clown wears a baggy, white, spangled suit, and paints his face white. He is usually superior to the *augustes* (whose name means idiots), who wear brightly coloured and ridiculous suits, and paint their faces in brilliant colours.

Today circuses have come a long way since Astley's amphitheatre. The great circus artists travel from country to country gaining international fame, and at Christmas some of the circuses, like Bertram Mills', have a six-week season. Throughout the summer months they travel the roads with their caravans, 'big top', and animals, as they have for a century and a half, and indeed as the acrobats and animal trainers have done for thousands of years.

- ① clown (auguste)
- ② boxing kangaroo
- ③ trick rider
- ④ acrobat
- ⑤ balancing elephant
- ⑥ juggler
- ⑦ human cannon-ball
- ⑧ trapeze artist
- ⑨ performing seal
- ⑩ cycling chimpanzee
- ⑪ hippopotamus
- ⑫ knife thrower
- ⑬ cycling bear
- ⑭ lion tamer
- ⑮ snake charmer